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THE ELIXIR OF LIFE.

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THE search for elixirs of life is only one phase of that insatiable desire to investigate the infinite which has characterized the human species since it first made its appearance on the earth. The philosopher's stone, the fountain of youth, the squaring of the circle, perpetual motion, are other forms to which mankind have at different periods of the world's history given much time and thought. Some of these are, in the very nature of things, impossibilities, and not long ago the French Academy refused to receive any communications from those who pretended that they had discovered perpetual motion. But others are by no means impossibilities, and those who declare that they are have no clear idea of the matter at issue. The philosopher's stone, for instance, or something analogous thereto, which a few hundred years ago was the object of much scientific research, is probably by no means beyond the realm of realization. By the use of this agent it was supposed that the baser metals could be transmuted into gold. Subsequently, when science had made considerable progress, such a pretension was regarded as absolutely absurd, but recent advances in chemistry and physics have shown

us that many substances which were formerly supposed to be very different, one from another, are now known to be identical in every respect, except, perhaps, in their external forms; every year sees the list of so-called elementary substances decreased instead of increased in number, and there is strong reason for believing that there is, after all, but one form of matter which makes itself manifest to us under different aspects. He is an ignoramus who asserts that it is *impossible* that lead and gold can be identical. All that he can truthfully say is that they appear to us to be very different from each other, and that science has not yet demonstrated that they are the same substance under different forms. The same ignoramus, with little less sciolism, would just as emphatically declare that two substances as unlike each other in all obvious characteristics as a diamond of the first water and a piece of common charcoal are as distinct from each other as night from day.

The fact is that, outside of the domains of mathematics and physics, there are no impossibilities in nature. For instance, two bodies cannot occupy the same space at the same time, and two and two added together can never, under any circumstances, be any other number than four; but many things which are ordinarily regarded as impossible, simply because they have not yet been proved, may to-morrow become established facts. The sagacious critic reserves his opinion relative to unfamiliar subjects and those which are apparently at variance with his idea of the laws of nature; but he knows how little he really knows, and therefore waits, ready to believe or disbelieve, in accordance with further developments and new facts.

Now, there is nothing inherently impossible in a so-called "elixir of life"—that is, in a substance that, when taken into the system, may so arrest the deteriorating influences of old age as to prolong life and to render existence more tolerable. Neither is there anything unworthy in medical science in the search for such an agent. There are persons, and they seem to be especially numerous in the profession of medicine, who, never having made an original observation themselves, or performed an experiment outside the grubbing routine of their daily drudgery, cry "quackery," and "humbug," and "fraud" at everything new that is brought to their attention. It is something of which they have never previously heard, and which they have never

investigated, and which, therefore, must be an impossibility. They belong to the same class as those who persecuted Harvey when he discovered the circulation of the blood. His detractors expelled him from the medical societies to which he belonged, refused to consult with him, and denounced him as an impostor. Had it not been for the open countenance of the King, they would probably have succeeded in burying Harvey and the circulation of the blood in a common grave. Many of us know how, even in our own time, the discoverer of anæsthesia was stigmatized as an ignoramus and a quack.

It is only necessary for a physician anxious to enlarge the boundaries of his science to announce some discovery of the virtues of a drug, to be pounced upon by these narrow-minded donkeys with ridicule and abuse. In their eyes all innovation is quackery. To hold views different from theirs in regard, for instance, to the functions of an organ of the body or the power of a remedy is an immorality not less in heinousness than picking a pocket or committing a burglary. The experiments are necessarily fictitious, the cases are manufactured for the occasion, and the would-be discoverer should be placed beyond the pale of association with the body of his profession. Fortunately in this age of the world there is a power in public opinion which keeps malicious sloths and dullards with their noses to the grindstone. They never rise to the level of respectable mediocrity in their profession, and the truth prevails in spite of their impotent rage and pitiable ignorance.

But while there is no impossibility in an "elixir of life," it is very certain that until now all the attempts that have been made to discover such an agent have resulted in disappointment, and this not so much from anything inherently improbable in such investigations as in the manner in which they were conducted. Up to the present time the subject has not engaged the attention of the medical profession for several centuries. One of the latest works on the subject is that of Fra Donato D'Eremita, published in Naples in 1624, and it must be confessed that, from the standpoint of the science of the present day, it is rather a ridiculous production. It contains a great many engravings of instruments and apparatus of a complicated character for the attainment of ends that might just as readily have been reached by much simpler means. For instance, there is a cumbersome arrange-

ment for effecting distillation by the agency of the sun ; the rays being received upon a mirror and thence transmitted to a retort. There is another, consisting of an alembic with a series of receivers one above the other, the lower one receiving the grosser products of the distillation, while the higher catches those that are more refined and ethereal. The substances of which his "elixir" was made were vegetable, animal, and mineral, to the number of nearly a hundred. Among them were valerian, cassia, cinnamon, mace, aloes, artemesia, honey, vipers, musk, asphalt, bezoar stones, coral, pearls, sapphires, emeralds, agate, gold, silver, topaz, and others "too numerous to mention." It was regarded as a specific in more than three hundred different diseases, among them being gout, apoplexy, loss of sight, cancer, carbuncle, catarrh, dysentery, epilepsy, herpes, paralysis, tabes, and various mental affections.

The difficulty with Fra Donato is that the virtues of his "elixir" are entirely hypothetical. Experiment and fact are altogether foreign to his investigations. He assumes that the various agents entering into his compositions possess certain properties, and from this assumption he infers, with a degree of positiveness equal to that of the obstructors of scientific research to whom I have referred, that it must necessarily be possessed of curative powers far in excess of those belonging to any other known remedy. And yet, after all, there is nothing *impossible* in the claims of Fra Donato. He simply omitted the very necessary preliminary of proving that his pretensions were based upon facts, and it would take a great many facts to establish his "elixir" as a therapeutical agent or a prolonger of life.

Now, let us see how a searcher for an "elixir of life" would go to work in our own time.

There are two ways by which such an agent could be discovered, if in reality such an agent exists.

First—By empiricism.

Second—By investigation and research.

It is seldom the case that new remedies for diseases are discovered by any other means than by empiricism—that is, unreasoning experiment. A physician in search of a remedy for a disease with which he is unfamiliar, experiments with various substances which he imagines may be of service in his treatment. Sometimes more by accident than by any other cause he makes a

surprising discovery. This was the case with ether, the anæsthetic properties of which there was no reason to suspect from any knowledge of its properties we formerly possessed. The discovery of the virtues of Peruvian bark and its alkaloids in the treatment of malarial affections was also a matter of pure empiricism. The anæsthetic properties of cocaine could not possibly have been deduced from a knowledge of its chemical composition or of its action upon the organism when taken into the system. The like is true of mercury, the bromides, the iodides, and many other remedies, without which at the present day it would be impossible to practise medicine successfully. The "elixirs of life" compounded by Paracelsus, Roger Bacon, and others, consisted of substances chosen mainly by caprice or from some fancied analogy with the principle of life, the powers of which upon the human system were wholly unknown.

The object of true science is, of course, to lessen the domain of empiricism, while increasing that of rational therapeutics; but, at the same time, it must be borne in mind that the first object of the physician is to abolish suffering and to save life, and that for the accomplishment of these ends he is justified in using any means that, with or without reason, he thinks may be of service. Take, for instance, such diseases as hydrophobia and tetanus, from the first-named of which not a single case of authentic recovery is on record, and from the second of which the cures are almost infinitesimal in number. To experiment in the treatment of either of these diseases is a physician's bounden duty, for there is no known remedy for either of them. Of course, the scientific physician experiments in a more rational way than does the sciolist. His knowledge of anatomy, physiology, pathology, and of the general effects of medicines, gives him a great advantage over the ignoramus, and, if his patients recover, he is careful how he ascribes the result to his treatment rather than to the inherent forces of nature residing in the patient. But it has often happened that the ignoramus has hit upon a remedy for a hitherto unmanageable disease, when science, with everything in its favor, has ignominiously failed.

Again, a physician carefully studies the nature of the disease in regard to which he sets out to obtain a cure. He observes its course as it affects the lower animals; he makes dissections and brings all his knowledge of chemistry and microscopy to bear

upon the point at issue. He makes his experiments in the first place in his laboratory with medicines the actions of which are in a measure known to him, and which he has, therefore, reason to suppose he may find to be of value. Thus we will imagine a patient to be suffering from congestion of the spinal cord. We want a remedy that will lessen that congestion by constricting the blood-vessels. It has long been known that ergot has the power of contracting the organic muscular fibres of the uterus. The muscular fibres of the blood-vessels are of the kind called organic, and differ from the muscular tissue of the arms or legs, for instance, in the fact that they are not under the control of the will, and that, unlike these latter, they are not marked with transverse striæ. There is, therefore, some reason to suppose that ergot might contract the blood-vessels, and hence be of service in the treatment of spinal congestion.

But the evidence is not yet quite complete, for the organic muscular fibres of the uterus may be one thing and those of the blood-vessels another, in some way unknown to us, although they look precisely alike when examined with a microscope. Now, we take a frog, examine the web of his foot with a microscope, and then put a little ergot into his stomach, and in a short time we see the blood-vessels of the part contract and in some cases become so small as not to admit of the passage of the blood corpuscles. This is additional evidence, but there is still more to be had. We expose the spinal cord in a dog and then dose it with ergot. We see that a like result takes place as in the frog, for under its influence the blood-vessels of the part become smaller. We repeat these experiments many times, and then we are justified in saying that ergot contracts the blood-vessels of the spinal cord. Still we are not yet sure that its action in a diseased cord will be similar to that in a healthy cord. We give it to a patient who is suffering from congestion of the spinal cord and he recovers; and yet we are not sure, for the result may have been due to some other agent of which we have no certain knowledge. We repeat the experiment again and again. Sometimes our patients are cured, and again we fail. The failures may be due to the fact that all people are not alike, and that the system of one absorbs the medicine while that of others does not; that the disease may have advanced so far as to be beyond the reach of any remedy, or that we have made a mistake in our diagnosis

and have had to deal with some other disease than spinal congestion. So that, after all, the most that we can say in regard to the matter is that ergot is beneficial in some cases of spinal congestion.

Within a few weeks intelligence has been received in this country that Dr. Brown-Séquard, of Paris, certainly the most eminent living physiologist, especially so far as the nervous system is concerned, has been experimenting with the expressed juice of certain glands of the body with a view to discovering its effects when taken into the human system. The newspapers (not Dr. Brown-Séquard nor any other authority, so far as I know) have designated this juice the "Elixir of Life." As a result of his investigations he announced in an address delivered before the Société de Biologie, of which he is president, that, after a dozen or more injections under the skin of his own body of the juice from these glands taken from guinea-pigs and rabbits, he experienced a change that might almost be regarded as a rejuvenation. Dr. Brown-Séquard is seventy-two years of age, and he says he felt as though a weight of twenty years had been lifted from his life. He refers to other experiments performed upon the lower animals, all apparently leading to similar results. In addition, Dr. Variot relates the details of three cases of old persons in which, under like treatment, like effects to those obtained by Dr. Brown-Séquard were produced.

The first information received in this country of Dr. Brown-Séquard's researches was through a telegram to a New York newspaper, conveying such imperfect details, however, that the writer was disposed to question either the authenticity of the report or Dr. Brown-Séquard's mental equilibrium. It was apparently stated that various glands of the body were used in his experiments, and that Dr. Brown-Séquard had suddenly become a very much younger man than he had been. Further information, however, showed the exact nature of his experiments and of the claims which he had set up in their behalf. The writer therefore determined to examine into the matter for himself, and as the result of his investigation he is enabled to give, in such general terms as are suitable for a secular journal like THE NORTH AMERICAN REVIEW, a confirmation of Dr. Brown-Séquard's statements, so far as his researches have extended. And not only this, but he has apparently shown that muscular

rheumatism of long standing has been entirely relieved after a single injection of the juice in question. He has been careful to state, and he still so declares, that all the experiments performed up to this time are not sufficient to establish the claims of this glandular juice as an alleviator of old age or a curer of any disease whatever. The whole matter is yet in its experimental stage, and it will there remain until the subject has been examined into by many physicians under different circumstances, and a general coincidence of opinion obtained. A large part of the newspaper press of the country, with the sensational head-lines which they put to every communication on the subject, have done everything to give that exaggerated idea of Dr. Brown-Séquard's investigations which they now affect to deplore.

Now, Dr. Brown-Séquard did not go blindly to work with his experiments, for every intelligent physician knows the relation which exists between the glands in question and the mental and physical condition of the animal to which they belong. There is much *à-priori* reasoning to support the conclusions at which he has arrived. They are not based upon empiricism, but are rational investigations carried out with intelligence. Whether or not he has made any permanent addition to our means of assuaging the infirmities of old age or of curing disease, time alone can show. But those physicians who denounce honest investigation in this or any other direction are unworthy of the profession to which they belong, and should be relegated to some limbo where they can enjoy their self-satisfaction without coming in contact with their more energetic brethren.

WILLIAM A. HAMMOND.